

Validation

Active Learning and Lab Activity
Bioman Conference 2014

A. What is validation?

- “Establishing **documented evidence** which provides a **high degree of assurance** that a specific process will **consistently** produce a product meeting its **pre-determined specifications and quality attributes.**” ¹
- “The collection and evaluation of **data**, from the **process design stage throughout production**, which establishes **scientific evidence** that a process is capable of **consistently** delivering quality products” ²

¹ *Guideline on General Principles of Process Validation – May 1987*

² *Process Validation: General Principles and Practices , Rev. 1 – January 2011*

B. What must be validated?

- **M**aterials
- **M**anpower
- **M**ethodology
- **M**achinery

C. Types of Validation (Qualification) Protocols

- Design
- Installation
- Operational
- Computer System
 - Hardware
 - Software
- Performance

D. Plan for Today's Session (3 hours)

- Active Learning Activity – online atBioNetwork, NC Community Colleges
<http://www.ncbionetwork.org/educational-resources/interactive-elearning-tools/validation-fundamentals>
- Lab Activity – Validation of an Autoclave
 - Using NBC² SOP's

E. Worksheet for Active Learning Activity

1. History

In what year was the term “validate” included in the 21CFR?

2. Aspects of Validation

What specifications are determined before manufacturing occurs?

3. What must be validated?

Read and work through scenario 1 as a class

Read and work through scenario 2 and 3 in your small groups

4. Validation Life Cycle

Read and work through scenario 1 as a class

Read and work through scenario 2 in your small groups

F. Write a one paragraph summary on what you learned today about validation. Apply your knowledge to validation of an autoclave, in regards to a Performance validation.

G. Lab Activity – validation of an autoclave

Title: BTSure Biological Indicator SOP

Approvals

Preparer:	Lara Dowland	Date:	06Jan10
Reviewer:		Date:	

1. **Purpose:**
 - 1.1. Proper use of BTSure biological indicator.
2. **Scope:**
 - 2.1. To monitor the efficiency of laboratory autoclaves.
3. **Responsibilities:**
 - 3.1. It is the responsibility of the instructor to ensure that this SOP is performed as directed and to amend the procedure when necessary.
 - 3.2. It is the responsibility of the students to follow the SOP as described and to inform the instructor if any problems occur.
4. **References:**
 - 4.1. Autoclave SOP
 - 4.2. Incubator SOP
 - 4.3. BTSure Biological Indicator manufacturer instructions

5. Definitions:

5.1 N/A

6. Precautions:

6.1. The contents of the BTSure biological indicators are extremely hot and under pressure after autoclaving. They may burst and cause burns. Allow at least 10 minutes to cool before handling.

6.2. To dispose of the BTSure biological indicators, incinerate or autoclave for not less than 30 minutes at 121°C

7. Materials:

7.1. BTSure biological indicator units

7.2. BTSure crusher

7.3. autoclave

7.4. incubator (55-60°C)

7.5. small beaker

7.6. aluminum foil

7.7. thermally insulated gloves

8. Procedure:

8.1. Remove an appropriate number of BTSure biological indicator units from the box.

8.2. Remove one unit for each area of the autoclave to be tested and an additional unit to be used as a positive control (this one will not be placed in the autoclave).

8.3. Label the indicators with appropriate process information.

8.4. Place each indicator in a small beaker.

8.5. Place the beakers in the autoclave.

8.5.1. One of the beakers must be next to, or directly over, the drain. The area surrounding the drain is the coolest part of the autoclave, and is the least effective area for sterilization.

8.5.2. The positive control should not be placed in the autoclave.

8.6. Operate the autoclave, according to autoclave SOP.

8.7. Operator must wear thermally insulated gloves while removing materials from autoclave.

8.8. Remove beakers from the autoclave. Allow indicators to cool for at least 10 minutes.

8.9. Remove BTSure biological indicators from the beakers.

8.9.1. Observe color change (blue to black) of chemical indicator on the BTSure label.

NOTE: Color change only indicates exposure to steam, not acceptable sterilization.

8.10. Incubation:

8.10.1. Using the crusher, break the inner ampoule of each indicator.

8.10.2. Immediately place the indicators in the incubator.

8.10.3. Incubate at 55 to 60°C for at least 48 hours.

8.10.4. Interpretation:

8.10.4.1. Examine indicators at regular intervals for any change in color. Record the results.

8.10.4.1.1. The positive control indicator should change from purple to yellow. If it doesn't, then the study is invalid and must be repeated.

8.10.4.1.2. The sample indicators should not change. This indicates adequate sterilization.

8.10.4.1.3. If the sample indicators turn yellow then there was bacterial growth and the autoclave must be checked.

8.10.4.1.4. Report any indication of bacterial growth to instructor.

8.11. Dispose of all used BTSure tubes in a biohazard receptacle when finished.

9. Attachments:

9.1. Autoclave monitoring form

10. History:

Name	Date	Amendment
Lara Dowland	06Jan10	Initial release

Autoclave Monitoring Form

Customer Information:

Contact Name

Department Name

Equipment Information:

Name and Description

Model

Time Started Autoclave Cycle		
Time Completed Autoclave Cycle		
	Purple	Yellow
Initial color of indicator		
24 hours color of indicator		

Passed Monitoring:

Date of Monitoring

Technician

Passed ___ Yes

Failed Monitoring:

Technician

Reason for failure

Title: Market Forge Autoclave Operation SOP

Approvals:

Preparer:	Danielle Thompson	Date:	06Jan10
Reviewer:	Lara Dowland	Date:	4Feb10

1. Purpose

- 1.1. This procedure outlines the operating and maintenance instructions for the Market Forge Autoclave. The autoclave is used for sterilizing liquids such as water, cultures and test liquids, melting cultures and then keeping the warm, sterilizing equipment such as flasks, beakers or glass bioreactor vessels.

2. Scope

- 2.1. To describe the appropriate operating instructions necessary to operate the Market Forge Autoclave.

3. Responsibilities

- 3.1. It is the responsibility of the instructor/lab assistant to ensure that this SOP is performed as described and to update the procedure when necessary.
- 3.2. It is the responsibility of the students/technicians to follow the SOP as described and to inform the instructor about any deviations or problems that may occur while performing the procedure noting them in the equipment usage log.

4. Precautions

- 4.1. Do not allow the items being sterilized to block the hole of the temperature sensor inside the chamber. Failure to observe this warning may make it impossible to control the unit, causing incomplete sterilization.
- 4.2. To avoid scalding yourself when removing items or opening the chamber you must wear thermally insulated gloves.
- 4.3. Keep face clear of autoclave when opening chamber door.
- 4.4. Do not spill water onto the outside of the autoclave.
- 4.5. Verify that the packing of the drain hoses are securely into the hole in the exhaust tank and the cap is securely closed.
- 4.6. Failure to ensure the drain hose and cap are closed may cause steam to escape during operation and the result in scalding.
- 4.7. Set the power switch to off position after the unit has been used for the day.
- 4.8. To avoid scalding the drain valve needs to remain closed at all times. The only time that this will be open position is when draining off the chamber water.

4.9. Never put flammable items inside or near the autoclave; explosive substances, ignitable substances, oxidizing substances, flammable substances, combustible gases.

5. Materials

5.1. Market Forge's "Sterilmatic" Sterilizer, Model STM-E, Type C

5.2. 1 Gallon water

5.3. Items to be sterilized

5.4. protective gloves and safety glasses

5.5. Autoclave Indicator tape

6. Procedure:

6.1. Close drain (do not overtighten or it leaks).

6.2. Fill with water with about 1 gallon. Level should be just below lower door edge.

6.3. Make sure all items to be autoclaved are labeled appropriately (contents / prep date / initials). Stick a piece of "autoclave indicator" tape onto items. Do NOT autoclave dirty and clean media together or liquid with nonliquid items.

6.4. Make sure caps on all containers are very loose. Flasks of media should be plugged with gauze or loosely covered with a cap or aluminum foil. Spinner flasks should be set up properly for balanced spinning, but with caps loose.

6.5. Place items into autoclave: tall items fit best in the back, behind the open door.

6.6. Close and lock door: push handle down as far as it will go after it is latched.

6.7. Set exhaust to SLOW if liquids are being autoclaved; otherwise, set to "FAST." The slow setting will prevent boil over.

6.8. Set timer for 20 minutes, which starts the autoclave. The timer will start once the autoclave is up to temperature (121 degrees C). There is no bell to indicate when time is up: just watch the timer. NOTE: THE AUTOCLAVE MAKES A LOT OF BUZZING AND BANGING SOUNDS DURING NORMAL OPERATION.

6.9. After the autoclave cycle, wait until the pressure returns to zero and the temperature is less than 80 degrees C, put on safety glasses and the protective gloves. Crack the door to allow steam to escape.

6.10. Let the items in the autoclave cool so as to avoid handling superheated liquids, then take items out using protective gloves. Be careful not to compromise sterility.

6.11. When cool, drain water from autoclave into jug and discard down sink.

6.12. Leave autoclave door and drain open to air dry. Wash as needed to remove any spills according to manufacturer's instructions.

7. History:

Name	Date	Amendment
Danielle Thompson	04Feb10	Initial Release